CLAIMS

What is claimed is:

1. An interface circuit for interfacing between a pair of subscriber tip/ring lines and a central office of a telecommunications network, the interface circuit comprising:

(a) filter circuitry configured to separate low-frequency and high-frequency signals appearing on the tip/ring lines, wherein the filter circuitry comprises a blocking capacitor that affects the low-frequency impedance of the tip/ring lines;

(b) high-frequency interface circuitry configured to process the high-frequency signals; and

(c) low-frequency interface circuitry configured to process the low-frequency signals, wherein the low-frequency interface circuitry comprises:

(1) a subscriber line interface circuit (SLIC) configured between the tip and ring lines;

(2) a coder/decoder (CODEC) configured to encode and decode the low-frequency signals; and

(3) an impedance warping circuit (IWC) configured between the SLIC and the CODEC, wherein the IWC tends to compensate for the effect of the blocking capacitor on the low-frequency impedance between the tip/ring lines.

2. The invention of claim 1, wherein the compensation provided by the IWC provides a desired impedance between the tip/ring lines for both the low-frequency and high-frequency signals.

3. The invention of claim 2, wherein the desired impedance has a resistance of about 900 ohms and a capacitance of about 2.16 microfarads.

4. The invention of claim 1, wherein:

the high-frequency signals correspond to DSL signals having frequencies greater than about 4 kHz;

the low-frequency signals correspond to POTS signals having frequencies less than about 4 kHz; and

the filter circuitry comprises (i) a high-pass filter configured to provide the DSL signals to the high-frequency interface circuitry and (ii) a low-pass filter configured to provide the POTS signals to the low-frequency interface circuitry, wherein the blocking capacitor is part of the high-pass filter.

5. The invention of claim 1, wherein the IWC is configured to receive a first differential signal (e.g., VRTX, VTX of Figs. 3-4) from the SLIC and a second differential signal from the CODEC (e.g., VRN, VRP of Figs. 3-4) and generate a third differential signal provided to the SLIC (e.g., RCVN, RCVP of Figs. 3-4).

6. The invention of claim 5, wherein the IWC comprises:

(A) a first amplifier (e.g., **402** in Fig. 4) configured to generate a first single-ended output signal based on the second differential output signal; and

(B) a second amplifier (e.g., **404** in Fig. 4) configured to generate a second single-ended output signal based on the first differential output signal, wherein the first and second single-ended output signals are used to generate the third differential output signal.

7. The invention of claim 6, wherein:

the first amplifier comprises a first operational amplifier (e.g., **412**) configured as an inverter; and

the second amplifier comprises a second operational amplifier (e.g., **414**) configured as a frequency-dependent inverter, such that the third differential output signal increases when frequency of the low-frequency signals increases.

8. The invention of claim 7, wherein the second amplifier further comprises a resistor (e.g., R7) and a compensating capacitor (e.g., C2) configured in parallel between the inverting input and the output of the second operational amplifier.

9. The invention of claim 6, wherein the IWC further comprises an output filter (e.g., **406** of Fig. 4) configured to filter the first single-ended output signal generated by the first amplifier.

10. An impedance warping circuit (IWC) for an interface circuit for interfacing between a pair of subscriber tip/ring lines and a central office of a telecommunications network, the interface circuit comprising:

(a) filter circuitry configured to separate low-frequency and high-frequency signals appearing on the tip/ring lines, wherein the filter circuitry comprises a blocking capacitor that affects the low-frequency impedance of the tip/ring lines;

(b) high-frequency interface circuitry configured to process the high-frequency signals; and

(c) low-frequency interface circuitry configured to process the low-frequency signals, wherein the low-frequency interface circuitry comprises:

(1) a subscriber line interface circuit (SLIC) configured between the tip and ring lines;

(2) a coder/decoder (CODEC) configured to encode and decode the low-frequency signals; and

(3) the IWC configured between the SLIC and the CODEC, wherein the IWC tends to compensate for the effect of the blocking capacitor on the low-frequency impedance between the tip/ring lines.

11. The invention of claim 10, wherein the compensation provided by the IWC provides a desired impedance between the tip/ring lines for both the low-frequency and high-frequency signals.

12. The invention of claim 11, wherein the desired impedance has a resistance of about 900 ohms and about 2.16 microfarads.

13. The invention of claim 10, wherein:

the high-frequency signals correspond to DSL signals having frequencies greater than about 4 kHz;

the low-frequency signals correspond to POTS signals having frequencies less than about 4 kHz; and

the filter circuitry comprises (i) a high-pass filter configured to provide the DSL signals to the high-frequency interface circuitry and (ii) a low-pass filter configured to provide the POTS signals to the low-frequency interface circuitry, wherein the blocking capacitor is part of the high-pass filter.

14. The invention of claim 10, wherein the IWC is configured to receive a first differential signal (e.g., VRTX, VTX of Figs. 3-4) from the SLIC and a second differential signal from the CODEC (e.g., VRN, VRP of Figs. 3-4) and generate a third differential signal provided to the SLIC (e.g., RCVN, RCVP of Figs. 3-4).

15. The invention of claim 14, wherein the IWC comprises:

(A) a first amplifier (e.g., **402** in Fig. 4) configured to generate a first single-ended output signal based on the second differential output signal; and

(B) a second amplifier (e.g., **404** in Fig. 4) configured to generate a second single-ended output signal based on the first differential output signal, wherein the first and second single-ended output signals are used to generate the third differential output signal.

16. The invention of claim 15, wherein:

the first amplifier comprises a first operational amplifier (e.g., **412**) configured as an inverter; and

the second amplifier comprises a second operational amplifier (e.g., **414**) configured as a frequency-dependent inverter, such that the third differential output signal increases when frequency of the low-frequency signals increases.

17. The invention of claim 16, wherein the second amplifier further comprises a resistor (e.g., R7) and a compensating capacitor (e.g., C2) configured in parallel between the inverting input and the output of the second operational amplifier.

18. The invention of claim 15, wherein the IWC further comprises an output filter (e.g., **406** of Fig. 4) configured to filter the first single-ended output signal generated by the first amplifier.